

XXIII. *Observations of the Comet of Encke, made in June 1832.* By THOMAS HENDERSON, Esq., *His MAJESTY'S Astronomer at the Cape of Good Hope.* Communicated, by Command of the Lords Commissioners of the Admiralty, by Captain BEAUFORT, R.N., F.R.S., *Hydrographer to the Admiralty.*

Received May 17,—Read May 24, 1833.

THE following observations (excepting those with the transit instrument,) were made with a circular micrometer, constructed by SIMMS, and applied to an achromatic telescope of DOLLOND, forty-five inches in focal length, and three and a half inches aperture, furnished with a portable equatorial stand, which can be adjusted to any latitude. By means of the horary and declination circles, and the difference of right ascension and declination betwixt the comet and the nearest bright star, the telescope was readily pointed to the comet's place; but when the comet got to the southward of the zenith, and was near the meridian, the equatorial apparatus became useless, as its supports came in the way of the telescope: the telescope was then pointed to the comet according to the best estimate which the eye could make of its place in the heavens relatively to the neighbouring stars. The instrument was placed either at one of the windows of the Observatory building, or out of doors in a corner sheltered from the wind, where the best view of the quarter of the heavens where the comet was situated could be obtained. The magnifying power employed was thirty-two, and the radius of the ring was found to be 1015 seconds of arc.

The transit instrument by DOLLOND is nearly ten feet in focal length, and the object-glass is five inches in diameter. For observing the comet, an eye-glass, magnifying eighty-eight times (the lowest power which it possesses), was used.

June 2nd.—The times are reckoned according to the chronometer, French, No. 975, which was gaining 13·4 seconds per diem on mean solar time: 9^h 44^m 12^s by the chronometer corresponded to 17^h 22^m 6^s mean time.

The comet was first perceived about 16^h 54^m mean time, when it had attained an altitude of $6\frac{3}{4}^{\circ}$ above the horizon, the sun being then 25° below the horizon. It was seen at once on directing the telescope to the position indicated in the Ephemeris.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
		h m s	m s	m s	' "
1.	Comet, South....	9 31 16	33 22		
	* a, North.....	31 45	33 31	-0 19.5	-18 4
2.	Comet, South....	9 35 4	37 13		
	* a, North.....	35 38	37 24	-0 22.9	-17 13
3.	Comet, South....	9 39 1	41 9		
	* a, North.....	39 36.5	41 15	-0 21.1	-18 29
4.	Comet, South....	9 43 28	45 36.5		
	* a, North.....	44 7	45 43.5	-0 23.3	-18 32
5.	Comet, South....	9 49 8	50 51		
	* a, North.....	49 16.5	51 26.5	-0 22.1	-17 14
6.	* b, North.....	9 55 44	57 47	+5 23.3	
	* c, North.....	10 0 49	1 39	+0 54.0	
	Comet.....	1 1	3 15		
	* d, South.....	3 45.5	5 34	-2 32.0	
	* e, North.....	5 0.5	6 49	-3 47.4	

The comet appeared as an ill-defined nebulous mass, several minutes in diameter, brighter towards the middle. It seemed as bright as when I saw it on the meridian at Edinburgh, on November 22nd 1828, with an achromatic telescope of thirty inches focal length and two inches aperture; but not nearly so bright as it appeared in the beginning of December of the same year.

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		h m s	
a.....	7	3 43 58.8	-12 28 49
b (π Eridani)....	5	3 38 11.4	12 38 6
c.....	8	3 42 39.2	12 30 43
d.....	8	3 46 5.8	12 57 9
e.....	7	3 47 21.6	12 35 49

June 3rd.—The times are reckoned according to the chronometer, French, No. 975, which was gaining 13.4 seconds per diem on mean solar time; 9^h 27^m 15^s of the chronometer corresponded to 17^h 4^m 55^s mean time.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
		h m s	m s	m s	
1. {	* <i>f</i> , South	9 21 52	23 13.5	+0 23.3	+21 53
	Comet, North....	21 54	23 57		
2. {	* <i>f</i> , South	9 26 14.5	27 42.5	+0 25.9	+22 18
	Comet, North....	26 25	28 23		
3. {	* <i>f</i> , South	9 30 15	31 48	+0 24.8	+21 16
	Comet, North....	30 25.5	32 26		

The sky was hazy, and the comet faint. Afterwards clouds came on.

Apparent place of the star.

Star.	Magni- tude.	R.	Declination.
<i>f</i>	7.8	h m s 3 39 7.9	—15° 0' 21"

June 4th.—The times are reckoned by the assistant clock, which was losing 4.7 seconds in the hour on sidereal time: 0^h 17^m 0^s of the clock corresponded to 21^h 55^m 58^s sidereal time.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
		h m s	m s	m s	
1. {	* <i>g</i> , North	0 26 39.5	28 1.5	+0 37.3	— 7 50
	Comet, North....	26 52	29 4		
	* <i>h</i> , South	29 34	31 8.5	—2 23.3	+18 34
2. {	* <i>g</i> , North	0 33 35	34 43	+0 38.3	— 8 0
	Comet, North....	33 43	35 52		
	* <i>h</i> , South	36 18	38 2	—2 22.7	+18 20
3. {	* <i>g</i> , North	0 39 53.7	40 43	+0 37.4	— 8 17
	Comet, North....	39 53	41 59		
	* <i>h</i> , South	42 24	44 15.5	—2 23.9	+18 1
4. {	* <i>g</i> , North	0 46 6	47 35.5	+0 36.1	— 7 52
	Comet, North....	46 20	48 34		
	* <i>h</i> , South	49 6	50 34.5	—2 23.4	+18 26
5. {	* <i>g</i> , North	0 52 2.5	53 18	+0 36.6	— 8 24
	Comet, North....	52 11	54 23		
	* <i>h</i> , South	54 52	56 31	—2 24.6	+18 0
6. {	Comet, North....	1 1 28	3 39		
	* <i>i</i> , North	1 38	3 36.2	—0 3.8	— 3 3
7. {	* <i>g</i>	1 5 3	6 16	+0 33.4	—11 7
	Comet, North....	5 4	7 22		
	* <i>i</i>	5 18	7 22	—0 7.2	— 4 44

The comet had nearly the same appearance as on the 2nd.

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		h m s	° ′ ″
<i>g</i>	8	3 34 29.4	—16 30 20
<i>h</i>	8.9	3 37 29.8	16 56 40
<i>i</i>	9	3 35 9.4	16 37 2

June 5th.—The times are reckoned by the assistant clock, which was losing 4.8 seconds in the hour on sidereal time: 1^h 4^m 0^s of the clock corresponded to 22^h 47^m 43^s.5 sidereal time.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
		h m s	m s	m s	′ ″
1. {	* <i>k</i> , North	0 21 42	23 14	+1 0.0	—17 13
	Comet, South....	22 19	24 37		
2. {	* <i>k</i> , North	0 26 3	27 28.5	+1 0.8	—19 0
	Comet, South....	26 39	28 54		
3. {	* <i>k</i> , North	0 30 24.5	31 41	+0 58.2	—18 32
	Comet, South....	30 52	33 10		
4. {	* <i>l</i> , South	0 35 43	37 18	+1 50.1	+22 40
	Comet, North....	37 23	39 18		
5. {	* <i>l</i> , South	0 40 29	42 12	+1 50.5	+22 32
	Comet, North....	42 16	44 6		
6. {	* <i>l</i> , South	0 46 18	48 8.5	+1 49.2	+22 28
	Comet, North....	48 11	49 54		
7. {	* <i>l</i> , South	0 52 50.5	54 22	+1 49.3	+22 20
	Comet, North....	54 26	56 25		

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		h m s	° ′ ″
<i>k</i>	8	3 29 32.0	—18 26 7
<i>l</i>	8	3 28 37.2	19 6 34

On June 6th and 7th the weather prevented any observations being made.

June 8th.—The times are reckoned by the assistant clock, which was losing 2.4 seconds in the hour on sidereal time: 0^h 23^m 0^s of the clock corresponded to 21^h 38^m 9^s.2 sidereal time.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
1.	* <i>m</i> , North.....	h m s 0 24 53	m s 25 45	m s + 2 36.3	—30 9
	Comet, South....	27 15	28 35		
	* <i>n</i> , North.....	28 52	31 12.5	— 2 7.1	—20 3
2.	* <i>m</i> , North.....	0 32 38.5	33 23.5	+ 2 39.3	—31 19
	Comet, South....	35 7	36 13		
	* <i>n</i> , North.....	36 35	38 53.5	— 2 4.0	—21 31
3.	Comet, South....	0 48 18	50 28		
	* <i>n</i> , North.....	50 59	52 6.3	— 2 9.6	—23 24
4.	Comet, South....	0 55 28	57 25		
	* <i>n</i> , North.....	57 58	59 19.5	— 2 12.1	—24 40
	* <i>o</i> , North.....	1 5 38	8 6.5	—10 25.9	
5.	Comet.....	1 11 24	13 47		
	* <i>o</i>	22 0	24 13	—10 31.3	

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
<i>m</i>	7	h m s 3 12 14.5	—24 44 10
<i>n</i>	7.8	3 16 57.6	24 54 3
<i>o</i>	7	3 25 11.4	25 11 26

The comet was not again visible till the 23rd, owing partly to the weather, and partly to the moonlight, which obliterated the light of the comet even when the sky was clear.

June 23rd.—The times are reckoned by the assistant clock, which was losing 5.5 seconds in the hour on sidereal time: 1^h 53^m 0^s of the clock corresponded to 1^h 6^m 8^s.5 sidereal time.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
1.	Comet, South....	h m s 0 18 25	m s 21 15	m s	' "
	* <i>p</i> , South.....	23 34.5	27 14	— 5 34.0	— 3 27
	* <i>q</i> , South.....	26 4	29 40.5	— 8 2.3	— 3 10
	* <i>r</i> , North.....	28 34	32 43	—10 48.8	—17 58
2.	Comet, South....	0 39 40	42 20		
	* <i>p</i> , South.....	44 36.5	48 35	— 5 35.5	— 6 10
	* <i>q</i> , South.....	47 7	51 4.5	— 8 5.7	— 6 1
	* <i>r</i> , North.....	49 54	53 48	—10 51.2	—20 53

The comet was much fainter than when last observed. It was not visible in the telescopes of the meridian instruments, the twilight having commenced.

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		h m s	° ' "
<i>p</i>	7	0 26 13.9	—59 7 26
<i>q</i>	7.8	0 28 42.9	59 7 48
<i>r</i>	6.7	0 31 29.3	58 53 8

On June 24th and 25th the weather was unfavourable.

June 26th.—The times are reckoned by the assistant clock, which was losing 5.7 seconds in the hour on sidereal time: 1^h 31^m 0^s of the clock corresponded to 0^h 56^m 59^s sidereal time.

	Ingress.	Egress.	Comet minus Star.	
			R.	Declination.
	h m s	m s	m s	° ' "
* <i>s</i> , North.....	0 23 30	27 35	+3 17.6	— 3 27
* <i>t</i> , North.....	23 33	28 21	+2 53.1	
* <i>u</i> , South.....	24 27	28 15	+2 29.0	+16 13
Comet, North ..	26 35	31 5		

The comet was fainter than on the 23rd. It was not seen in the transit telescope as it passed the meridian. It is probable that a mistake was committed in setting the telescope.

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		h m s	° ' "
<i>s</i>	7	23 12 29.1	—62 12 36
<i>t</i>	7	23 12 49.0	—62 20 22
<i>u</i>	7	23 13 14.1	—62 32 46

June 27th.—This day's observations are reckoned by a clock of MOLYNEUX, losing 10.6 seconds in the day on mean solar time. At 16^h 30^m by the clock it was 3^m 28^s.6 slow of mean time.

The following observation of the comet's passage through the field of view

of the transit telescope was made by the assistant astronomer, Lieutenant W. MEADOWS, R.N. Not the slightest illumination could be permitted: the whole room had to be darkened to allow the comet being seen. The wires of the transit instrument were completely invisible.

The comet was not perceived till it had entered the field of view.

At 16^h 26^m 12^s it was estimated that the comet was in the middle of the field of view.

At 16 30 18 the preceding edge of the comet passed out of the field.

At 16 30 30 the whole was gone.

The telescope was set to 62° 48' of south declination, and the comet passed along the middle of the field.

The correction of the transit instrument for its deviation from the meridian, at the comet's parallel, was 1·1 second *additive*; and the time employed by an equatorial star in passing from the middle wire till its disappearance from the field is 126·9 seconds of sidereal time, for the eye-glass which was used.

The comet was not seen in the telescope of the mural circle.

		Ingress.	Egress.	Comet minus Star.	
				R.	Declination.
1. {	* <i>y</i>	^h ^m ^s 16 43 39	^m ^s 48 32	^m ^s +5 2·6	" "
	Comet	49 2	53 12		
2. {	* <i>w</i> , North.....	17 4 5	6 34	+7 24·4	—22 3
	* <i>x</i> , North.....	3 42	8 29	+6 38·3	—11 20
	* <i>y</i> , South.....	5 38	10 22	+4 43·5	— 2 43
	Comet, South ..	10 32	14 53		

The comet was very faint, and it was very difficult to estimate its centre.

Apparent places of the stars.

Stars.	Magni- tude.	R.	Declination.
		^h ^m ^s	[°] ['] ^{''}
<i>w</i>	7·8	22 46 15·0	—62 33 47
<i>x</i>	7·8	22 47 1·6	62 44 55
<i>y</i>	7·8	22 48 55·3	62 52 37

June 28th.—At the comet's meridian transit, it was seen very faintly in the

transit telescope: thin clouds were occasionally passing. The telescope was set to $63^{\circ} 5'$ of south declination. The comet was not detected till it was considerably advanced in the field of the telescope.

Time by transit clock.

h m s

22 38 35. Comet's centre was estimated to go out of the field.

22 39 4. A star of the 8th magnitude went out of the field.

22 39 32. Another of the same magnitude went out.

The comet was two or three minutes to the south of the first star.

The transit clock was $1^m 17^s.5$ fast of sidereal time; and the correction of the instrument and the distance of the extremity of the field from the middle wire were the same as stated yesterday.

The comet was seen still more faintly in DOLLOND's telescope with the circular micrometer; but owing to its faintness, and the passing clouds, it was impossible to make any observations.

It is to be regretted that the two stars seen in the transit telescope were not identified and observed at the proper season, as they would have afforded an approximation to the comet's declination. It is likely that they will still be observed.

June 29th.—I suspected that I saw the comet in DOLLOND's telescope; but so extremely faint that any attempt at observation was hopeless. Clouds at meridian transit.

July 6th.—The comet was not visible in the transit telescope at its meridian passage, though the sky was clear. It was no more looked for.

The positions of the stars above given have been determined from observations made in this observatory. The stars *a*, *b*, *c* and *e*, are in BESSEL's Zone, No. 271,

	Magn.	t.			δ
		h	m	s	
<i>a</i> . . .	7 . . .	3	43	37.50 . .	$-12^{\circ} 27' 42.5''$
<i>b</i> . . .	5 . . .	3	37	50.16 . .	$12 37 4.7$
<i>c</i> . . .	8 . . .	3	42	18.14 . .	$12 29 40.1$
<i>e</i> . . .	7 . . .	3	47	0.50 . .	$12 34 41.6$

b is π Eridani, No. 415 of the Astronomical Society's Catalogue; *d* is No. 217

and *e* No. 222 of the Constellation Eridanus in BODE's Catalogue; *f* is in BESSEL's Zone No. 262, 7.8 magnitude, $t = 3^h 39^m 33^s.98$; $\delta = -14^\circ 59' 3''.6$; *g*, *h*, *i*, *n* and *o* are in the Histoire Céleste Française,

	Magn.	Middle wire.			Zenith distance.		
		^h	^m	^s	[°]	[']	^{''}
<i>g</i> , page 478 . . .	8 . . .	3	33	15.5 . . .	65	23	27
<i>h</i> , ——— 557 . . .	8.9 . . .	3	36	16.3 . . .	65	49	30
<i>i</i> , ——— — . . .	9 . . .	3	33	56 . . .	65	30	7
<i>n</i> , ——— 563 . . .	7.8 . . .	3	15	53.0 . . .	73	47	4
<i>o</i> , ——— — . . .	7 . . .	3	24	7.4 . . .	74	4	5

r is in La Caille's Cælum Australe Stelliferum, Zone XII. 31st of August 1751, *in parte inferiore reticuli*, 6.7 magnit.

$$\left. \begin{array}{l} \begin{array}{ccc} \text{h} & \text{m} & \text{s} \\ 0 & 22 & 11 \end{array} \\ 30 \quad 33 \end{array} \right\}$$

In computing the differences of right ascension and declination betwixt the comet and stars, allowance has been made for the comet's motion throughout, and for the effect of refraction for the observations preceding June 23rd. For the observations of that and subsequent days, the effect of refraction has been disregarded, as insensible. The sign + denotes the comet to be more advanced in right ascension than the star, or to the northward of it; the sign — the contrary.

From the observations, the following positions of the comet, cleared of refraction and parallax, have been computed. They are therefore the apparent geocentric places of the comet.

No.	Date.	Mean time.			R.	Declination.		
		^h	^m	^s		[°]	[']	^{''}
	1832.							
1	June 2	17	18	31		- 12	46	57
2	"	17	22	6	3 43	35.0		
3	" 3	17	4	55	3 39	31.1	14	38 46
4	" 4	17	23	41	3 35	4.2	16	39 19
5	" 5	17	23	52	3 30	27.5	18	44 28
6	" 8	16	47	29			25	16 40
7	"	16	53	32	3 14	46.0		
8	" 23	17	45	4	0 20	38.7	59	12 11
9	" 26	17	33	36	23 15	44.6	62	16 4
10	" 27	16	29	21	22 54	14.0		
11	"	17	5	24	22 53	49.2		
12	"	17	16	11			62	55 34
13	" 28	16	3	56	22 32	41.8		

The positions Nos. 10 and 13 are deduced from the observations of the egress of the comet's centre from the field of the transit telescope; the others, from the observations with the circular micrometer.

Observatory, Cape of Good Hope,
March 8, 1833.